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SPACE CENTER Roundup

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NASA spacesuit accepted for use in Russian Hydrolab Facility

Successful outcome opens door for additional crew training in Russia

History was made last May when a manned Extravehicular Mobility Unit spacesuit was tested for the first time in the Hydrolab Facility at the Gagarin Cosmonaut Training Center in Star City, Russia.

The objective of the test was to integrate two EMUs into the facility to support ISS procedural development and future crew training. The test proved that the Russian facility systems could interface with the EMU and that the Hydrolab could support human pressurized testing with two suits in the water. The successful outcome has opened the door for U.S. spacesuit ISS training capabilities in Star City.

As a result of the successful test, U.S. engineering test subjects, Russian test subjects, and U.S. flight crews are now able to operate in the EMU at the GCTC. The first of three sets of training for the crew of STS-101, ISS assembly flight 2A.2 scheduled for this December, began this month using the EMU in the Hydrolab Facility.

The Neutral Buoyancy Lab at JSC's Sonny Carter Training Facility currently does not have a mockup of the ISS Service Module, while the Hydrolab does. Since the scheduled space walks for the 2A.2 crew will be conducted in the EMU with the Service Module, a way had to be found to train the crew in the American suits in the Hydrolab.

The test concluded a two-year effort between

Russian and American specialists, with the former explaining their facility and its systems, what its interfaces are, how proper levels of environmental control and safety could be maintained, and what was the best method to integrate the EMU into the Hydrolab.

The integration team led by Hamilton Sundstrand (Hamilton Standard and the Sundstrand Corporation recently merged) included members from NASA, HSMS, Wyle, ILC, Hernandez Engineering, Johnson Engineering, TTI and GCTC. Vincent Witt, a senior project engineer with Hamilton Sundstrand, was the team lead for the test.

"The team conducted a variety of activities over the course of several months prior to the final test last May," said Witt. "These activities not only tested the suit and support equipment, but also tested the suit processing proficiencies of the GCTC people based on the training that our U.S. engineers had provided them on the EMU. We wanted to ensure

the Russians had been trained properly to deal with nominal and emergency operations of the EMU in the Hydrolab."

Processing the EMU is more involved than the Russian Orlan spacesuit because it is one piece, unlike the EMU, which has many pieces. The Russians do not process their suit. Instead, they simply resize their suit to fit the test subject prior to each suited event. U.S. suit engineers had to teach them how to process, size and check out the EMU. Hardware to perform this task had to be supplied, and the Russians had to build a place to store the equipment.

Another aspect of the readiness to support EMU training was that safety divers from the NBL had to ensure that the Russian divers were qualified to work with the EMU. U.S. dive trainers ensured that the Russian divers knew how to perform nominal and emergency operations with the suit.

Testing of the EMU in the Hydrolab began last March. Initially, an unmanned 1-G test was conducted. The EMU was

attached to support equipment to check the suit and ensure that everything worked properly. This was followed by multiple unmanned water tests using a weighted mannequin. Unmanned water tests with a mannequin are conducted on a regular basis at the NBL to check out the suit, NBL, and support equipment. Next, a single, one suit, 1-G manned operation, with the test subject standing by the pool, was performed. The suit was pressurized to different levels to test the Environmental Control System (ECS) and human interaction. Then a test was performed on the pool deck to test the ECS and loads placed upon it with two people, as would nominally be the situation for crew training.

In May, the unmanned and the manned 1-G tests were repeated. An earlier test, an unmanned water test with a weighted mannequin, was also repeated. A final readiness review cleared the way for the first manned EMU test in the water.

Marquis Gibbs, a diver at the NBL, was the first U.S. spacesuit subject. He was placed into the suit and lowered into the water. The reaction of the Russian ECS was tested to see how it would react with a person in the suit in the water performing regular activities.

"When the message came that I was selected to support EMU

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Watch out for
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above.

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